

## FUELS

### LAWS, REGULATIONS, POLICY:

#### *National Fire Plan*

One of the key points in the development of the National Fire Plan is to provide national direction to reduce future fire risk by treating fuels. Specific National Fire Plan goals and objectives relevant to the project include:

- Reduce the number of small fires that can become large
- Restore natural ecological systems to minimize uncharacteristically intense fires
- Reduce the threat to life and property from catastrophic fire
- Assign the highest priority for hazardous fuels reduction to communities at risk

The communities of Inkom and Pocatello, Idaho have been identified as an “at risk” interface community in regards to the National Fire Plan.

#### *Caribou National Forest Land and Resource Management Plan*

The Caribou National Forest Land and Resource Management Plan (LMP) contains specific management area prescriptions for the entire Forest. The direction for fuel treatment activities are:

Modify activity fuels to permit fire suppression forces to meet fire protection objectives for the area.

The direction for vegetation treated by burning is to:

1. Use prescribed fire to accomplish resource management objectives, such as reducing fuel load buildup, wildlife habitat improvement, etc. Resource objectives and burning prescriptions will be developed at the project level.
2. Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values.
3. Use natural ignitions within areas identified in this plan (with an approved Fire Use Plan) to achieve management objectives.

#### *Cohesive Strategy*

The Cohesive Strategy is the Forest Service response to the GAO report issued in 1999. The report “Protecting People and Sustaining Resources in Fire-adapted Ecosystems: A Cohesive Strategy to Reduce Over-Accumulated Vegetation” approved on October 13, 2000 provides an approach to achieve improved forest and grassland resilience by reducing fuel loadings in fire-prone forests in order to protect people and sustain resources. The strategy focuses treatment on high-risk areas rather than least cost acres.

The Cohesive Strategy establishes a framework that restores and maintains ecosystem health in fire-adapted ecosystems for priority areas across the interior West. In accomplishing this, it is intended to:

- Improve the resilience and sustainability of forests and grasslands at risk,
- Conserve priority watersheds, species and biodiversity,
- Reduce wildland fire costs, losses and damages and
- Better ensure public and firefighter safety.

#### ***Forest Service Manuals and Handbooks***

Specific guidelines for Wildland Fire Use and prescribed fire applications are found in the Forest Service Manual 5100 (Fire Management) and a number of Forest Service Handbooks resulting from FSM 5100 direction. Forest Service Handbook 5109.19 (Fire Analysis and Planning) gives specific direction on planning practices related to Fire and Fuels management.

In 1995, the Federal Wildland Fire Policy and Program Review were initiated (USDI/USDA et al 1995). Some of the principles of this review included: 1) firefighter and public safety are the first priority; 2) wildland fire is an essential ecological process and natural change agent; and 3) fire management plans must be based on the best available science. This policy contains direction to allow Wildland Fire Use and prescribed fire to restore fire's natural role in appropriate areas where approved plans are in place.

The Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide (USDI/USDA 1998) is an interagency guide established to standardize procedures for implementation of the Federal Wildland Fire Policy and Program Review of 1995.

## **AFFECTED ENVIRONMENT**

Many elements play a role in fire behavior, but the primary factors are fuels, weather and topography (Rothermel 1983, Scott, et. al. 2001). The severity and intensity of a fire depends on the many combinations of these factors. The only element that land managers can affect is fuel (Pollet, et. al. 1999) with the goal being to preemptively modify fire behavior through changes to the fuel complex (Finney 2001).

Fuels are composed of vegetation, live and dead that occur on a site (Anderson 1982). The amount of fuels present, the type of fuels, their size, distribution and arrangement govern whether an ignition will result in a sustaining fire (Anderson 1982). Fuels are described in this analysis as down woody vegetation, ladder fuels and fuel model because these parameters can be observed, measured and treated on the landscape.

One of the main purposes of this project is to provide safe firefighting conditions within the Pocatello West Bench Project area. This can be measured by the fireline intensity of a potential fire.

## Down Woody Material

Down woody material is the dead twigs, branches, stems and boles of trees and brush that lie on or above the ground in various forms of decay (Brown 1974, Graham, et.al. 1994). Twigs, branches, grass and forbs (fine fuels) contribute to the spread and initial intensity of a fire. Large woody debris greater than three inches in diameter have little influence on spread and intensity of the initiating fire, however they can contribute to development of large fires and fire severity (Brown 2001). A fire can smolder in areas that have accumulations of large woody debris and can be fanned by high winds into fast moving fires (Brown 2001). Fire spotting and potential for crown fire are greater where large woody debris has accumulated under a forest canopy (Brown 2001).

Resistance to control (estimate of the suppression force required to control a fire) is based on the amount of down woody material present in the area where fire suppression efforts occur. High and Extreme ratings for resistance to control occur in the following combinations: (Brown 2001)

	0 to 3 inches diameter	3 to 10 inches diameter
	High	Extreme
5 tons per acre	25 tons per acre	40 tons per acre
10 tons per acre	15 tons per acre	25 tons per acre
15 tons per acre	5 tons per acre	15 tons per acre

Down woody material ranges from < 5 tons to > 45 tons per acre within the treatment units, and include all sound, and rotten material.

## Ladder Fuel

Ladder fuel is any vertical vegetation such as seedlings, saplings or shrubs that connects the surface fire to the crown fuels or canopy of the overstory trees potentially causing a crown fire (Finney 1998). Crown fires are intense, fast moving, destructive fires that burn within the canopy of trees (Scott, et.al. 2001). Certain conditions favor crown fires over surface fires such as dry fuels, low humidity, high temperatures, heavy accumulations of dead and downed litter, conifer seedlings and other ladder fuels, steep slopes, strong winds, unstable atmosphere and continuous trees (Rothermel 1991).

Concentrations of dead and downed litter, ladder fuels and continuous forest canopy are the only conditions that land managers can change. Rothermel (1991) describes the occurrence of crown fire ignition when the intensity of a surface fire increases based on the degree of favorable crown fire conditions and flames begin to reach into the crowns or climb ladder fuels into the tree crowns causing the needles to ignite. The flames may involve one tree (torching) or a group of trees (crowning) depending on the overall tree

crown density within the area. If tree crowns are not continuous, the flaming crowns will burn out and stop spreading. Before the crowns burn out, they may create firebrands or embers that fall to the ground or are carried ahead of the crown fire where they fall to the ground and possibly start a new ground fire called a spot fire (Rothermel 1983). If this behavior continues, a crown fire may be sustained for longer periods of time and over greater distances.

Crown fires are generally rare, but their impact can be very severe (Rothermel 1991). Crown fires are more difficult to control than surface fires, their rate of spread is several times faster and spotting is frequent and can occur over long distances (Scott 2001). Spotting makes structures more difficult to defend from crown fires than surface fires causing more risk to residential development if it lies in close proximity to stands prone to crown fires (Scott 2001).

Ladder fuels are a component of some of the proposed treatment units. The ladder fuels are arranged in clumps or singly throughout the treatment units and are composed primarily of Juniper, Juniper seedlings, saplings and shrubs.

## Fuel Models

Fuel models are a tool for estimating fire behavior and can be assessed on the ground, which is why it is one of the parameters to be used to predict fire behavior in this analysis. Fuel models are tuned to the fine fuels that carry a fire, describing the conditions at the head of the fire and were developed for the time of year when fires burn well (Rothermel 1983). Anderson (1982) describes 13 models, four of which are represented within the proposed treatment areas of the Portneuf West Bench fuels reduction project area. Estimations of each fuel model within the project area is shown in Table A followed by descriptions.

Table A: Fuel Models Estimated in Project Area

<b>FUEL MODELS</b>	<b>ACRES</b>	<b>PERCENT OF TREATMENT AREA</b>
<b>1</b>	<b>160</b>	<b>2.6</b>
<b>2</b>	<b>1684</b>	<b>27.9</b>
<b>5</b>	<b>280</b>	<b>4.7</b>
<b>6</b>	<b>2800</b>	<b>46.5</b>
<b>10</b>	<b>1100</b>	<b>18.3</b>

Fuel Model 1 falls within the grass group and few shrubs or timber are present. The fine herbaceous fuels that have cured or are nearly cured govern fire spread. Fires move rapidly through cured grass and associated material. (Anderson 1982)

Fuel Model 2 falls within the grass group with an intermix of Sage and can also be represented by open Juniper stands. Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, litter

and dead-downed stemwood from the open shrub or Juniper overstory, contribute to fire intensity. Expected rates of spread and fireline intensities are moderate to high. (Anderson 1982)

Fuel Model 5 falls within the brush group. In this model, fire is generally carried in the surface fuels that are made up of litter cast by the shrubs, and the grasses or forbs in the understory. The fires are generally not very intense because the surface fuel loads are light; the shrubs are young with little dead material and have poor burning properties because of live vegetation. Shrubs are generally not tall, but have nearly total coverage of the area. (Anderson 1982)

Fuel Model 6 falls within the high shrub / Pinyon-Juniper group and can be represented by Juniper with an intermix of sagebrush or other shrubs stands. This model has moderate burning ground fires with low to moderate flame heights, with occasional heavy fuel concentrations or greater than 8 mph winds that cause higher flame lengths and higher intensity burning conditions. Only under severe weather conditions involving high temperatures, low humidity's, and high winds, do the fuels pose fire hazards. (Anderson 1982)

Fuel Model 10 falls within the timber group and can be represented by heavy Juniper stands with a heavy understory and higher concentrations of down and dead material. This model has moderate burning ground fires with low to medium flame heights, with occasional heavy fuel concentrations that can cause higher flame lengths. Only under severe weather conditions involving high temperatures, low humidity's, and high winds, do the fuels pose fire hazards. Fires in fuel model 10 are at the upper limit of control by direct attack. (Anderson 1982)

## Flame Length

Direct suppression on a fire is usually made during the initial runs of the fire when it is burning the surface fuels. Flame length is used to interpret suppression efforts. Fires with a flame length less than four feet, can usually be attacked at the head or flanks by persons using handtools (Rothermel 1983). Fires with flame lengths between four and eight feet are too intense for direct attack by persons using hand tools; equipment such as bulldozers, pumper trucks and retardant planes can be effective (Rothermel 1983). Flame lengths between eight and eleven feet may present serious control problems, torching of individual trees, crown fires and spot fires may occur (Rothermel 1983). Flame lengths greater than eleven feet may cause crown fires, spotting and major fire runs (Rothermel 1983). Steep slopes and wind can cause fire to burn more rapidly and with greater intensity; both of these factors tilt the flame over the unburned fuel and bring it to ignition sooner than if these factors were not present (Rothermel 1983). Indirect attack or no suppression effort may be the only tactics for the last two scenarios.

## **ENVIRONMENTAL CONSEQUENCES**

The analysis area for fire behavior and fuel characteristics are the treatment units because this is where land managers can affect fire behavior by manipulating fuels. Land managers would like to reduce the chances of crown fires because compared to surface fires, they produce more smoke, cause more resource loss, remove more nutrients from an area and increase the threat to life and property (Scott 1998).

### **Analysis Methods**

Limited inventories of the forested vegetation were conducted to measure fuel characteristics. BEHAVE models are used to predict forest vegetation structure and model fire behavior characteristics.

## **Alternative A – No Action**

### ***Down Woody Material***

Direct and Indirect Effects – Down woody material would remain as stated in Affected Environment with no treatment and would continue to increase as the vegetation matures, dies and falls to the ground. Needles, leaves, twigs, branches and dead trees would continue to fall to the ground increasing the down woody fuel loads until a fire burns through the area. Units with greater than 25 tons per acre of (0" to 3") and (3" to 10") will have a high resistance to fire control and would be more likely to support crown fire given optimum conditions. Steep slopes would further exacerbate higher resistance to control. Slopes range from 10 to 60 plus percent within the project area.

It is difficult to predict when a fire would burn through the project area. If one were to occur and depending on the intensity of the fire, all or some of the down woody material would be burned. Most of the smaller fuels less than three inches in diameter would be consumed in a ground fire. Depending on the weather, portions of the logs bigger than three inches would also be consumed in a fire. The amount and arrangement of down woody material would help feed the fire. The higher concentrations of large woody material could increase fire's intensity, further exacerbated by other factors such as wind, moisture and slope. An increase in all of these factors would create a situation where the fire would be more intense creating the possibility of spot fires and crown fire. The hotter the fire the greater the consumption of these fuels leaving less on the ground.

### ***Ladder Fuel***

Direct and Indirect Effects – Ladder fuels would continue to be a component of 100 percent of the juniper stands within the project area in clumps or singly. As the vegetation matures, mature trees would die creating openings in the canopy and an increase in downed fuels, allowing more shrubs and seedlings to become established and grow under the main canopy of the stands. Ladder fuels would persist in the understory. Presence of ladder fuels would increase the chances of a crown fire in the future. If a crown fire occurred, very little vegetation would remain with the exception of dead twigs, branches, needles and snags.

None of the proposed treatment units would have the continuous crown fuels broken up by thinning the smaller trees. This would continue to make the stands susceptible to crown fire. A crown fire would kill most of the vegetation in its path including large juniper stands.

Units of juniper would not be thinned, leaving a dense stand that would reduce the ground cover and grasses used by wildlife. Within 30 years, these stands would be very susceptible to crown fire because of the continuous crown fuels. The continuous crown would support a high intensity fire killing most of the vegetation.

### ***Fuel Models***

Direct and Indirect Effects – Fuel models would not change within the project area and fire would be spread by the main component in the understory as described in Affected Environment. There would be an increase in the fine fuels (less than three inches diameter) that carry a fire as more needles, twigs and branches fall to the ground. This addition of fine fuels would increase the intensity of a future fire. When a fire eventually burns through the surface fuels, they would be reduced or totally consumed depending on the concentrations, decreasing the amount of fuels available to burn in the future until these materials accumulate from the existing vegetation.

### ***Fire Behavior Without Treatments***

Fire behavior is difficult to predict because of the many variables such as weather, slope, ignition area and source, etc. Flame length is used to determine what type of suppression effort can be deployed. BEHAVE fire model was used to predict flame lengths for each fuel model. Fire behavior for both alternatives were predicted for two types of weather, a fairly “normal” August such as that experienced in 2001 and an extreme weather year such as August 2000. The fire model started a fire in the vicinity of Gibson Jack because it is likely a fire may start there at some time due to human presence. These two weather years were used to model crown fire potential, flame length and to describe suppression tactics and firefighter safety.

Direct and Indirect Effects – If a fire were to occur within the project area during a “normal” weather year, flame lengths would range from 1 to 10 feet. Direct attack by hand crews or mechanized equipment could be made on areas where flame lengths were less than eight feet as long as they remained within the surface and did not get into the crowns. Approximately 42 percent of the project area would have flame lengths less than four feet allowing suppression with persons using hand tools. One percent of the project area could have flame lengths greater than four feet requiring mechanized equipment or indirect tactics to suppress the fire. It was predicted that approximately seven percent of the project area would experience crown fire and 32 percent of the project area would experience a surface fire. If structures were in the path of these crown fires, direct suppression methods could not be employed. Experience has shown that most surface

fires in a “normal” weather year are caught with direct attack without much loss of resources (Belknap 2002). Firefighters would most likely be able to safely protect structures such as homes if a surface fire threatened them in a “normal” weather year.

During a severe weather year, fire would have the potential to burn as a fast spreading, high intensity fire (Scott 1998), flame lengths would range from one to greater than six feet, individual trees would torch and crown fires could occur in areas where the crowns were continuous. Hot, dry weather would preheat the fuels causing them to be dryer and more flammable. Direct attack by hand crews or mechanized equipment would not be possible with the crown fires and other efforts such as indirect attack would have to be employed. There would be no remaining surface vegetation where fire burned with high intensity and no live vegetation where crown fires burned. The presence of down woody material and ladder fuels would increase the fire behavior within the treatment units making suppression efforts difficult. Fire crews would not be able to fight the fire directly, and would have to rely on indirect efforts to suppress the fire. Indirect efforts may entail building a firebreak a distance from the front of the fire in hopes that it would drop out of the crowns allowing more direct attack. Structures would have to be protected by indirect methods such as foaming, or sprinklers to protect them. It may not be safe to have firefighters in the area due to extreme fire behavior.

### **Cumulative Effects for Alternative A**

The analysis area for cumulative effects is the Pocatello West Bench Urban Interface fuels reduction project area because the surrounding landscape can affect fire behavior. Past activities such as fire suppression, grazing and logging have changed the vegetative composition and structure within the project area creating a situation where fire cannot play its natural role without burning with high intensities. Given the current vegetative situation and a hot dry year, a fire has the potential to consume anything in its path leaving a pattern of dead vegetation, abundant snags, less juniper than desired and heavy concentrations of down woody material once the snags fall to the ground. Following is a description of how past, present and future activities affect fuels and fire behavior.

**Fire** – Lack of past wildfires have contributed to the current vegetative condition. The lack of fire due to suppression efforts has increased the amount of surface fuels and ladder fuels especially in juniper and sagebrush stands and increased the amount of downed woody debris in some areas. Future wildfires have the potential to become unmanageable due to the high concentrations of fuels in the area and could burn with greater intensity than they have burned in the past.

**Prescribe Fire** – In the past, management ignited fire has been used to reduce sagebrush and other brush in units through broadcast burning. This has reduced surface fuels and large down woody material in those areas.

**Livestock Grazing** – Grazing can reduce fine fuels such as grass that carries a fire. Past grazing practices greatly reduced the fine fuels preventing most fires from burning in the area. Some areas do not have grazing permitted and others have been reduced in the

recent past. This has resulted in an increase of fine fuels in some areas. Current and future grazing practices can have the same effect within the allotment.

Summer and Winter Motorized Recreation – These activities do not change fuel characteristics, amount or distribution and therefore does not affect fire behavior, but could increase public risk of those recreating.

Noxious Weed Treatment – Past noxious weed treatment has no effect on fuel characteristics, amount or distribution. Current and future treatments may slightly increase the flammability of the area when the vegetation dies, but overall would not increase fuels.

Private Land Development – Past development established the land ownership pattern within the project area. Current and future development would increase the need for fuel reduction to create fire safe conditions along the urban interface

Hunting – Hunting has no effect on fuel characteristics, amount or distribution and therefore does not affect fire behavior. Hunters are a possible ignition source especially in the autumn when vegetation has cured and is more susceptible to burning, and again could increase public risk of those hunting.

Special Uses – Special use activities have no effect on fuel characteristics, amount or distribution and therefore do not affect fire behavior.

## **Alternative B Proposed Alternative**

### ***Down Woody Material***

Direct and Indirect Effects – Thinning and ladder fuel treatments would increase down woody material until slash treatments (broadcast or pile burning) were applied (one to two years following thinning). Broadcast burning would decrease all down woody material to a range of one to fifteen tons per acre in a mosaic pattern across the treatment units. Piling and burning the slash would mainly decrease the larger down woody materials in patches or pockets and leave the smaller needles, twigs and branches across the unit. One to four tons per acre would be left in units adjacent to private land and four to fifteen tons per acre would be left in all other units. Resistance to control would be less than high in all treatment units allowing direct suppression of a fire and reducing the risk of spot or crown fire.

Treatments to reduce down woody material include broadcast burning and piling the material and burning the piles. Broadcast burning can be accomplished in several different ways: by hand igniting the area or aerial ignition. Hand ignition is accomplished by persons walking in the area and igniting the fire with hand torches that drip ignited fuel. This method involves a lot of time and personnel and provides more control over the amount and intensity of fire applied to the area. It is used for burning

small or sensitive areas. Aerial ignition is accomplished with a plastic sphere dispenser (PSD) that disperses ping pong balls filled with a combustible material. A helitorch can also be used for aerial ignition. This is a 35-gallon barrel suspended from a helicopter that drips and ignites small droplets of fuel across the burn unit. Aerial ignition is used for larger units, or areas where it is too dangerous to put people. Aerial ignition usually costs less but the control of the ignition is not as specific.

### ***Ladder Fuel***

Direct and Indirect Effects – Ladder fuel treatments would remove trees less than eight inches in diameter to a 18 by 18 foot spacing breaking up the continuity of the ladder fuels. These trees would be felled and either broadcast burned or piled and burned leaving one to fifteen tons per acre down woody material scattered on the ground. Prior to slash treatment, the risk of high intensity fire fueled by the large slash accumulations would be high. Broadcast burning would decrease all down woody material in a mosaic pattern across the treatment units. Piling and burning the slash would mainly decrease the larger down woody materials in patches or pockets and leave the smaller needles, twigs and branches across the unit.

Eventually (20 to 30 years), new seedlings and saplings may become established in the understory of mature stands creating a ladder fuel condition similar to today triggering the need for future maintenance treatments to prevent ladder fuels from carrying fire into the crowns.

Following broadcast burning or pile burning, the down woody material created from the treatments would be reduced to one to fifteen tons per acre. Slash treatment would break up the continuity of down woody material and fine fuels. The combination of ladder and crown fuel reduction would greatly decrease the likelihood of crown fires. The crown bulk density threshold for crown fires is 0.10 kilograms per cubic meter, with crown fire likely above the threshold and no crown fire activity below it (Agee 1996). Individual trees may torch, but there would not be enough fuel to sustain a crown fire. Eventually (10 to 50 years), the crowns will grow together and additional thinning would occur to maintain a discontinuous crown layer.

### ***Fuel Model***

Direct and Indirect Effects – Vegetative composition would change, favoring open spaces and breaks in the continuity of the fuels, but fuel models would remain the same as stated in the Affected Environment following all the prescribed treatments. In units where broadcast or pile burning occurs, the surface fuels would be reduced and non-continuous providing less material to burn in future fires and decreasing fire intensity.

Following thinning and ladder fuel reduction and prior to slash treatment, there would be a continuous fuel bed composed of all the down woody material remaining from the treatments briefly changing the fuel model to 11 (Graham et. al. 1999). Flame lengths associated with this fuel model is 3.5 feet to 8.

## ***Fire Behavior With Treatments***

Direct and Indirect Effects – These treatments would make the area more “fire safe”, meaning they will have species diversity, age structure diversity, and fuel levels (down woody material less than 15 tons per acre) such that crown fires are unlikely to begin or spread (Brown 2000). Surface fire intensity would be reduced by removal of fine fuels through broadcast. A reduction in ladder fuels provides less opportunity to start crown fires. A decrease in crown continuity (crown bulk density) provides less opportunity to sustain crown fire.

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If a fire were to occur within the project area during a “normal” weather year, the fire would burn as a slow spreading, low intensity surface fire (Scott 1998), flame lengths would range from one to six feet. Direct attack by hand crews or mechanized equipment could be made on these fires. There would be less chance of crown fire within the treatment units following removal of the down woody material and ladder fuels. The tree crowns would be thinned and not able to sustain crown fire. Experience has shown that most of these fires are caught with direct attack without much damage to the vegetation (Belknap, 2002). Firefighters would most likely be able to protect structures such as homes if they were threatened due to the decrease in fire intensity (Omi, et. al. 2002).

During a severe weather year, fire would have the potential to burn as a fast spreading ground fire or high intensity crown fire (Scott 1998), but within the treatment units, fire intensity would be less due to reduction in fuels; flame lengths would range from one to six feet. Direct attack by hand crews or mechanized equipment would be possible because a portion of the fuels would have been removed causing the fire to remain on the ground and giving fire crews a better chance of catching it. Structures would be easier to defend and safer for firefighters to be in the vicinity of treated areas (Omi, et. al. 2002).

Treating the surface fuels such as sagebrush and other brush species through broadcast burning or burning slash piles, minimizes fire intensity (Graham, et. al. 1999, Scott 1998). Thinning reduces the amount of crown available to burn (crown bulk density) during a crown fire and removes the vegetation in the understory (crown base height) that carries the fire into the crowns (Scott 1998). Thinning would therefore reduce the potential for crown fire by lowering crown bulk density and redistribute fuel loads, thus decreasing fire intensities when surface fuels are treated by broadcast burning and pile burning (Graham, et. al. 1999, Scott 1998). Reducing the number of junipers through thinning and ladder fuels treatments, creates conditions where crown fires are difficult to initiate and sustain (Graham, et. al. 1999).

Without slash treatment fire behavior for approximately five years following thinning in units would be very intense due to the amount of fine fuels accumulated on the surface (Pollet, et. al. 1999). Following five years, these fine fuels would have melted into the ground, decreasing the chance for high intensity surface fires.

Thinning and burning of slash indirectly limits fire size by facilitating suppression (Finney 2001). Fireline construction can be faster and more effective when concentrations of down woody material are removed and spotting from torching trees is

limited (Finney 2001). When fire encounters the treated areas, suppression is facilitated by allowing direct or indirect tactics to adapt to changes in fire behavior (Finney 2001). The reduction of ladder fuels facilitates control of these fires that are similar to grass fires because spotting is reduced and fire intensity is lowered (Finney 2001). Spotting is reduced with reduction in ladder fuels that create embers, lowering the potential for crown type fires. (Finney 2001).

Overall, reducing ladder fuels, decreasing the amount of down woody material and increasing spacing between crowns in the overstory would reduce the hazard of catastrophic fire and decrease the likelihood of a sustained crown fire if a fire started or burned within the treatment areas. Resistance to control would be low to moderate allowing firefighters a safe chance to directly attack the fire.

Alternative B treats the project area providing a mosaic of fuels across the landscape; the vegetation continuity within the landscape is more broken. Alternative B would provide more opportunities to suppress a fire (depending on where it started) than alternative A. Alternative B treats units adjacent to urban interface providing safer areas for firefighters to suppress fires when they encroach upon the interface.

### **Cumulative Effects for Alternative B**

The analysis area for cumulative effects is the Pocatello West Bench Urban Interface fuels reduction project because the surrounding landscape can affect fire behavior.

Past vegetation manipulation activities such as wildfire, grazing and fire control have contributed to the current state of the vegetation within the project area. The proposed treatments would reduce surface fuels, ladder fuels and crown continuity within the treatment units. Future vegetation treatment projects can further this effort as long as surface fuels are reduced or maintained. Future fire behavior would be decreased if it burned in the treatment units and firefighter safety would not be compromised. A pattern of treated patches within the project area can provide more options for fire suppression by connecting the treatment areas depending on where fire is, how fast it is spreading and the type of suppression forces available. Implementation of these fuel treatments would give land managers the ability to re-introduce fire to the landscape, maintaining lower fuel concentrations without threat of high intensity fire.

### **Monitoring**

Vegetation treatments would be monitored following all treatments to ensure that objective of the vegetation prescriptions are met. Type of fuel model would be assessed to note if they changed from the original fuel model following all treatments. If a fire burns in the area following treatment, fire behavior would be noted within the treatment areas to document change in behavior and verify analysis for future projects.

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